

Table 2 shows a deficiency in the total solar radiation received on a horizontal surface from the sun and sky at the three stations for which normals have been determined.

Skylight polarization measurements made at Madison on 16 days give a mean of 61 per cent with a maximum of 69 per cent on the 1st. These are close to normal values for March at Madison. At Washington, measurements made on 11 days give a mean of 54 per cent with a maximum of 68 per cent on the 4th. The maximum is above and the mean is below the corresponding averages for March at Washington.

TABLE 1.—Solar radiation intensities during March, 1927

[Gram-calories per minute per square centimeter of normal surface]

WASHINGTON, D. C.

Date	Sun's zenith distance											Local mean solar time
	8a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon	
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	
Mar. 3	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
2	2.49		1.00	1.14	1.29						1.78	
4	2.06	0.95	1.06	1.21	1.37	1.55	1.20	1.04	0.94	0.80	1.88	
5	2.87	0.91	1.04	1.18	1.32	1.48					2.62	
10	3.30	0.71	0.83	0.97	1.11	1.40	0.97	0.74	0.62		3.00	
11	4.17						1.21				4.75	
15	5.79		0.59	0.76	0.97						6.50	
16	6.27	0.51	0.66	0.83	1.10	1.37	1.26	1.02	0.79	0.61	7.04	
17	7.29		0.65	0.82	0.95						9.33	
25	3.81				0.88	1.12					3.99	
29	3.63		0.58	0.69	0.96						3.81	
Means		0.77	0.80	0.95	1.11	1.38	1.16	0.93	0.78	(0.70)		
Departures		+0.06	+0.00	+0.01	-0.04	-0.05	+0.03	-0.01	-0.02	+0.01		

MADISON, WIS.

Mar. 2	1.60	1.13	1.29	1.42	1.56	1.43	1.88
3	2.06	1.07	1.20	1.31	1.43	1.57	1.78
8	3.63	1.07	1.18	1.36	1.57	1.88	3.15
9	3.63	1.07	1.18	1.36	1.57	1.88	4.37
14	5.56	1.07	1.18	1.36	1.57	1.88	5.56
15	4.75	1.07	1.18	1.36	1.57	1.88	6.76
17	4.57	1.07	1.18	1.36	1.57	1.88	3.99
22	3.00	1.05	1.16	1.28	1.54	1.30	3.00
28	3.15	1.05	1.16	1.28	1.54	1.30	2.49
30	4.57	1.05	1.16	1.28	1.54	1.30	4.57
Means	(1.13)	1.11	1.24	1.28	1.54	1.30	
Departures	+0.14	+0.07	+0.06	-0.04	+0.03	+0.07	

LINCOLN, NEBR.

Mar. 2	2.36	1.17	1.37	1.53	1.20	1.11	1.01	1.88
3	1.96	0.84	0.96	1.14	1.36	1.29	1.11	2.36
4	3.15	0.53	0.66	0.83	1.05	1.29	1.11	4.37
7	4.37	0.85	1.00	1.19	1.38	1.59	1.11	3.45
8	3.63	0.85	1.00	1.19	1.38	1.59	1.11	3.30
9	3.99	0.85	1.00	1.19	1.38	1.59	1.11	4.37
14	4.37	0.75	0.96	1.14	1.36	1.29	1.11	4.95
21	3.63	0.85	1.00	1.19	1.38	1.59	1.11	2.62
26	2.87	1.05	1.20	1.36	1.54	1.30	1.11	2.87
Means	0.74	0.92	1.13	1.30	1.54	1.32	0.98	0.93
Departures	-0.12	-0.03	+0.03	+0.01	+0.03	+0.07	+0.03	+0.10

* Extrapolated.

TABLE 2.—Solar and sky radiation received on a horizontal surface

[Gram-calories per square centimeter of horizontal surface]

Week beginning	Average daily radiation						Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Twin Falls	Washington	Madison	Lincoln
	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Feb. 26	302	284	322	228	304	243	+8	+14	-21
Mar. 5	319	236	281	199	243	243	+9	-42	-66
12	333	313	298	210	244	244	-4	+7	-79
19	225	205	328	136	240	240	-132	-105	-82
26	169	322	255	205	217	371	-178	-17	-157
Deficiency since first of year on Apr. 1							-3,766	-1,407	-3,338

* Four-day mean.

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. Edwin T. Pollock, Superintendent U. S. Naval Observatory]

[Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson Observatories]

Date	Eastern standard civil time	Heliographic		Area *	
		Longi- tude	Latitude	Spot	Group
1927					
Mar. 1 (Naval Observatory).....	h. m. 11 31	° -44. 0 -13. 5 +40. 5 +44. 5	° +23. 0 -18. 0 +13. 5 -23. 0	123	62 93 31
Mar. 2 (Harvard).....	12 20	-27. 0 +2. 0	+27. 0 -15. 0	242	212
Mar. 3 (Naval Observatory).....	11 44	-72. 0 -71. 0 -17. 0 +13. 0 +28. 0 +62. 0	-13. 0 +10. 0 +23. 5 -17. 5 -18. 0 +13. 5	185 123	62 98 46 31
Mar. 4 (Naval Observatory).....	11 48	-59. 5 -59. 0 -3. 0 +25. 5 +41. 5	-13. 5 +10. 0 +23. 5 -17. 5 -17. 5	247 62	93 154 62 62
Mar. 5 (Naval Observatory).....	11 50	-49. 0 -47. 0 -45. 5 +12. 5 +39. 0 +54. 0	-20. 0 -13. 0 +10. 0 +22. 0 -18. 0 -17. 5	185 31 108	77 123
Mar. 6 (Naval Observatory).....	11 42	-38. 0 -32. 5 -32. 0 -31. 5 +20. 0 +28. 0 +52. 0 +71. 0	-20. 5 -13. 5 +19. 5 +10. 0 +24. 5 +21. 5 -18. 0 -17. 0	46 154 31 31 123 62	31 93
Mar. 7 (Naval Observatory).....	13 40	-22. 0 -19. 5 -19. 0 -18. 5 +33. 0 +42. 5 +66. 0	-22. 5 +18. 0 -15. 5 +10. 0 +27. 0 +22. 0 -15. 5	154 93	62 46 31 31 108
Mar. 8 (Naval Observatory).....	11 50	-24. 0 -11. 0 -7. 5 -7. 0 -5. 0 +47. 0 +56. 0 +62. 5 +70. 0 +77. 5	+10. 0 -22. 0 -13. 5 +19. 0 +10. 0 +26. 0 +22. 0 -19. 0 +7. 5 -17. 5	154 42 37 123	10 62 46 31 123
Mar. 10 (Naval Observatory).....	11 49	-34. 0 -32. 5 +18. 5 +19. 0 +77. 5	-20. 0 +16. 5 -21. 0 -14. 5 -21. 0	108 31 139	15 108 31 93
Mar. 11 (Naval Observatory).....	11 46	-78. 5 -19. 5 -19. 0 +29. 0 +31. 5	-9. 5 -19. 5 +15. 5 -21. 0 -14. 5	154	62 262 62
Mar. 12 (Naval Observatory).....	11 42	-65. 0 -5. 0 -5. 0 +44. 5	-9. 5 +15. 5 -19. 0 -14. 0	154	216 46 139
Mar. 13 (Naval Observatory).....	11 41	-78. 0 -71. 5 -52. 0 +7. 5 +7. 5 +50. 5 +59. 0 +59. 5	+17. 5 +31. 0 -9. 5 +15. 5 -18. 0 +17. 5 -12. 5 -18. 5	123 154 185 123 139	154 15 18 31 152
Mar. 14 (Harvard).....	11 34	-69. 0 -60. 0 -55. 0 -34. 0 +29. 0 +75. 0	-9. 0 +18. 0 +32. 0 -7. 0 +17. 0 -10. 0	136 152 182	409 76
Mar. 15 (Naval Observatory).....	11 45	-64. 0 -57. 0 -49. 5 -45. 0 -26. 0 -24. 0 +37. 5 +85. 0	-9. 0 +35. 0 +18. 0 +31. 0 -9. 5 +19. 5 +15. 5 -12. 5	247 679 123 154 154	679 31 123
Mar. 16 (Naval Observatory).....	11 46	-55. 5 -47. 0 -44. 0 -37. 0 -31. 0 -12. 0 -9. 5 +51. 0	-11. 0 -8. 0 +35. 0 +18. 0 +31. 0 -9. 0 +19. 0 +15. 5	123 154 139	123 31 123 710

* Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere.

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic		Area	
		Longi- tude	Latitude	Spot	Group
1927		°	°		
Mar. 17 (Naval Observatory)	h. m.				
	11 57	-66.0	-10.0	-----	31
		-54.0	-10.5	-----	31
		-42.0	-11.0	-----	31
		-33.5	-8.0	-----	123
		-32.0	+34.0	-----	586
		-22.5	+18.0	108	-----
		-19.0	+31.0	154	-----
		+1.0	-9.0	123	-----
		+3.5	+18.5	-----	77
		+68.0	+16.0	-----	93
Mar. 18 (Naval Observatory)	11 42	-52.0	-10.0	-----	15
		-40.0	-10.5	-----	108
		-19.5	-8.0	-----	62
		-18.0	+34.0	-----	432
		-10.0	+18.0	108	-----
		-7.5	+31.0	154	-----
		+14.5	-9.0	123	-----
		+16.0	+18.5	-----	216
		+82.0	+15.0	62	-----
Mar. 19 (Naval Observatory)	11 33	-38.0	-9.5	-----	10
		-26.0	-10.5	-----	185
		-7.5	-9.0	-----	46
		-5.0	+34.0	-----	463
		+3.5	+18.0	93	-----
		+7.5	+30.5	154	-----
		+28.5	-9.5	-----	93
		+29.5	+18.5	-----	185
Mar. 20 (Naval Observatory)	12 38	-29.5	-10.5	-----	46
		-11.0	-10.5	-----	154
		+2.0	+15.0	15	-----
		+7.0	+34.5	-----	494
		+7.5	-9.5	31	-----
		+17.5	+18.0	123	-----
		+19.5	+30.5	-----	216
		+42.0	-9.5	62	-----
		+42.5	+18.5	-----	185
Mar. 21 (Mount Wilson)	14 45	-22.5	+8.0	-----	16
		-15.0	+4.0	2	-----
		-14.0	-11.0	-----	5
		+3.5	-11.5	-----	91
		+18.0	-12.0	-----	13
		+25.0	+33.0	-----	472
		+32.5	+17.0	106	-----
		+53.0	-9.5	-----	38
		+55.0	+18.0	-----	41
Mar. 22 (Naval Observatory)	11 45	+15.0	-11.0	-----	139
		+32.0	+35.0	-----	370
		+33.5	-10.0	31	-----
		+44.0	+13.0	123	-----
		+44.5	+31.0	185	-----
		+67.5	+18.0	-----	185
		+69.5	-9.0	31	-----
Mar. 23 (Naval Observatory)	13 16	-44.0	-17.0	-----	49
		+30.0	-11.5	-----	108
		+44.0	+35.0	-----	216
		+58.5	+17.5	62	-----
		+69.0	+31.0	139	-----
Mar. 24 (Naval Observatory)	12 55	-65.0	+11.0	62	-----
		-29.0	-17.5	-----	31
		+45.0	-11.0	-----	46
		+68.0	+34.0	-----	154
		+70.0	+30.5	123	-----
		+71.0	+17.5	108	-----
Mar. 25 (Naval Observatory)	11 45	-52.0	+10.5	31	-----
		-15.0	-17.0	-----	15
		+10.5	-9.0	-----	46
		+55.0	-12.0	-----	31
		+69.5	+35.0	-----	123
		+85.0	+17.5	154	-----
		+86.0	+30.5	154	-----
Mar. 26 (Naval Observatory)	13 58	-57.5	-41.0	-----	31
		-37.5	+11.0	31	-----
		-11.5	-15.0	10	-----
		+24.0	-9.5	-----	62
Mar. 27 (Naval Observatory)	13 24	-24.0	+11.0	31	-----
		+38.0	-9.5	-----	62
		+44.0	+15.0	-----	62
Mar. 28 (Naval Observatory)	14 8	No spots.	+17.5	-----	-----
Mar. 29 (Naval Observatory)	11 43	-78.0	-17.5	154	-----
		-7.5	-24.0	-----	62
		-80.0	+12.0	309	-----
Mar. 31 (Naval Observatory)	13 41	-49.5	-13.5	-----	15
		-49.0	+17.5	108	-----
		-2.5	+11.0	-----	15

AEROLOGICAL OBSERVATIONS

By L. T. SAMUELS

With the exception of the lower levels at Due West and the 4,000 and 4,500 meter levels at Ellendale, all of the mean free-air temperatures for March were above normal. (See Table 1.) The largest departures occurred in the upper levels at Broken Arrow and Royal Center. As a rule the resultant winds contained an excess of

southerly component over the normal wherever the mean temperatures were above normal. (See Table 2.) Relative humidity and vapor pressures were mostly above normal, the largest departures of both elements occurring at Groesbeck.

A conspicuous feature of the resultant winds as shown by pilot-balloon observations was the pronounced north component at 2,000 meters above San Francisco and Los Angeles, whereas at some 30 other stations widely distributed over the country an equally marked west component was found at the same level. At 4,000 meters this northerly component obtained over the north Pacific coast as well, the resultants at Medford and Seattle being the same at this level as at San Francisco and Los Angeles, while at stations to the east the west component continued to predominate. An unusually large number of observations reaching very high altitudes at Medford indicated a steady increase in the north component to at least 9,000 meters where the resultant was N. 9° W. 13.5 m. p. s.

Two kite flights made at Due West on the 1st and 2d were of more than ordinary interest in that they were made during a snowfall. On the 1st this station was situated in the northeast quadrant of a low-pressure area approaching from the southwest. The kite flight showed a lapse rate of 0.47° C. per 100 meters from the ground to 900 meters above, then an inversion with a lapse rate of -0.47° C. to 1,500 meters, the maximum altitude reached. The entire air column including the inversion layer was saturated, the base of the St.-Cu. clouds being 100 meters above ground. The wind veered from east-northeast at the surface to southeast at the highest altitude. A moderate to light snowfall continued throughout the flight. Owing to the limited height reached it is, of course, not known whether the inversion continued to an even higher elevation or whether the lapse rate changed to positive and became relatively steep.

If we assume the latter, the precipitation can be explained by the overrunning of the warm saturated air within the inversion by a cold current above. Such a condition might obviously result in convection in these upper levels and in the case of saturated air produce precipitation as well. On the other hand it may be assumed that the warm air observed within the inversion had been forced up over the colder air lying nearest the ground. This forced ascent might, of course, result in sufficient cooling to produce condensation and precipitation.

By the next morning this Low's center lay just off the Carolina coast and Due West was in its west quadrant. The kite flight at this time showed practically the same temperatures and lapse rate to 900 meters above ground, the latter being 0.43° C. per 100 meters as compared to 0.47° C. on the day preceding. For the next 600 meters, however, the inversion which was found on the 1st was now replaced by colder air wherein the lapse rate was 0.45° C. Thus at 1,500 meters above ground the temperature was 6° C. lower on the 2d than on the 1st. The winds on the 2d backed from north at the surface to northwest at 1,500 meters above. Light to moderate snow fell during the ascent of this flight but before it ended the St. clouds had broken, revealing A.Cu. from the northwest and the precipitation ended.

It seems probable that the warm moisture-laden air transported from the southeast, which was observed within the inversion layer on the 1st, under-ran the cold air found above 1,500 meters on the 2d, assuming the temperature above this level had not changed appreci-